

LA-UR-19-23350

Approved for public release; distribution is unlimited.

Title: Safety Evaluation of Remediated Nitrate Salt Waste

Author(s): Duval, Paul Bernard

Chancellor, Christopher John

Intended for: Report

Issued: 2020-07-15 (rev.1)



Notice: The current controlled version of this document is on the LCODocs website (https://lcodocs.lanl.gov/). A printed copy of the document may not be the current version.

LOS ALAMOS NATIONAL LABORATORY CARLSBAD OPERATIONS

DWT-RPT-006, Revision 1

Safety Evaluation of Remediated Nitrate Salt Waste

Effective Date: 7-9-0000 Originator(s): Paul B Duval, LANL-CO Christopher J Chancellor, LANL-CO Reviewed by: Jean-Francois Lucchini, LANL-CO Approved by: Beverly Crawford, LANL-CO Difficult Waste Team Leader Laurie Smith, LANL-CO Quality Assurance Manager 7-6-2020 Doug Weaver, LANL-CO Program Director/Division Leader Date

Executive Summary

The basis for the safe emplacement at the Waste Isolation Pilot Plant (WIPP) of all transuranic (TRU) waste that is presently stored at the Waste Control Specialists (WCS) facility near Andrews, Texas has been evaluated. This basis is founded upon a recent report that evaluated the safety hazards associated with nitric acid and/or metal nitrate salts commingled with oxidizable polysaccharide materials. The hazard from this mixture is closely associated with a positive feedback loop inherent to nitrogen redox chemistry that can initiate an autocatalytic thermal runaway, with potentially explosive gas generation.

The current document focuses on a narrow subset of those polysaccharides, namely the starch based kitty litter. Combined with nitric acid and/or metal nitrate salts, this remediated nitrate salt (RNS) waste was implicated in the radiological release at WIPP in 2014 and poses the main hazard for TRU waste stored at the WCS facility. The population of 113 drums at the WCS that potentially contain RNS waste has been designated with the descriptor Type 3. These drums are nested within standard waste boxes (SWBs) that originated from Los Alamos National Laboratory (LANL) and were placed into Modular Concrete Canisters (MCCs) and buried below grade under a shallow layer of sand in the Federal Waste Facility (FWF).

In a previous report, a latency period was established beyond which nitric acid stored with polysaccharide material in a TRU waste drum may no longer present a hazard. The Type 3 waste at WCS was specifically excluded from this latency period because of the prolonged duration in which nitric acid commingled with starch based kitty litter could potentially remain hazardous under ambient conditions. The inherent reactivity of Type 3 waste is typically manifested in slow steady state gas generation with minimal self-heating that continues so long as it can be sustained. In the absence of an external heat source the vast majority of Type 3 drums stored at WCS therefore do NOT pose a risk of autocatalytic thermal runaway.

In closed systems and/or elevated temperature, a very select few drums are capable of initiating an autocatalytic cycle that could lead to thermal runaway. However, among 671 RNS drums – 507 of them previously deposited in WIPP – drum 68660 is the only one known to have undergone thermal runaway at a scale sufficient to breach confinement, where special circumstances specific to this drum (a closed system is highly suggestive) seem to have applied. Conservatively assuming the 72 day latency associated with drum 68660 and applying the same ten-fold safety margin as previously adopted for other polysaccharide materials, Type 3 waste at the WCS facility would be *deemed safe after being stored for approximately two years* (with a minimum mean daily temperature of 50 °F to which the waste has been exposed).

Acronyms and Abbreviations

BDR - Batch Data Record

°C - Degrees Celsius

cf. - "Compare"

CSB - Container Storage BuildingDOE - Department of Energy

DSA - Documented Safety Analysis

e.g. - "For example"

°F - Degrees FahrenheitFWF - Federal Waste Facility

ID - Identification i.e. - "That is"

LANL - Los Alamos National Laboratory
 MCC - Modular Concrete Container
 NCR - Nonconformance Report
 POC - Pipe Overpack Component

PUREX - Plutonium Uranium Redox ExtractionRCRA - Resource Conservation and Recovery Act

RNS - Remediated Nitrate Salt
 RTR - Real-Time Radiography
 SNL - Sandia National Laboratories

SWB - Standard Waste Box

TCEQ - Texas Commission on Environmental Quality

TRU - Transuranic

WCRRF - Waste Characterization, Reduction, and Repackaging Facility

WCS - Waste Control SpecialistsWIPP - Waste Isolation Pilot Plant

TABLE OF CONTENTS

	Executive Summary	.2
	Acronyms and Abbreviations	3
1.0	Purpose and Scope	5
2.0	Background	5
3.0	TRU Waste Currently Stored at WCS	6
4.0	Understanding Nitrate Chemistry – The Key to Safer and More Efficient TRU Acceptance	
	4.1 Safety Evaluation of Cellulose with Nitric Acid	6
	4.2 Safety Evaluation of WCS Type 3 Waste	7
5.0	Safety Strategy	11
6.0	Conclusions	. 12
7.0	References	13
	Attachment A	15

1.0 Purpose and Scope

The purpose of this report is to demonstrate the basis for the safe emplacement at WIPP of all TRU waste that is presently stored at the WCS facility near Andrews, Texas, a basis provided by a recent report [Ref. 1] that evaluated the safety hazards associated with nitric acid and/or metal nitrate salts commingled with oxidizable polysaccharide materials. The scope of this document focuses on a narrow subset of those polysaccharides, namely the starch based kitty litter that was implicated in the radiological release at WIPP and which comprises the main hazard for TRU waste stored at the WCS facility.

2.0 Background

For a brief period (April-May 2014) following the shutdown of WIPP after the fire event and the radiological release event from drum 68660 in February, TRU waste from LANL was diverted to the WCS facility in west Texas for temporary storage. Of those waste containers, a number were from the same waste stream as drum 68660 and therefore assumed to contain nitric acid/metal nitrate salts commingled with starch based kitty litter - i.e., remediated nitrate salt (RNS) - the same concoction that has since been implicated in the WIPP radiological release. This population of TRU waste at the WCS facility has been designated with the descriptor Type 3 (i.e., containing potentially ignitable and/or corrosive constituents analogous to that which was responsible for the WIPP radiological release), which distinguishes it from Type 2 waste (containing similar ignitable and/or corrosive constituents, but possessing a composition that differs – i.e., from a different waste stream – from that which was responsible for the WIPP radiological release) and Type 1 (identified as not containing ignitable or corrosive constituents).

With the operating mandate at the WCS facility initially permitting temporary storage of TRU waste for one year from the time of receipt, a number of potential pathways have been submitted to the Texas Commission on Environmental Quality (TCEQ) for the ultimate disposition of this waste [Ref. 2, 3], with special emphasis on the safe disposition of the most hazardous Type 3 waste. To address these issues, this report documents the basis for the safe emplacement at WIPP of all TRU waste remaining at the WCS facility, based on a recent safety evaluation of the hazards of polysaccharides (starch based kitty litter and cellulose rags) in a TRU waste drum exposed to nitric acid and metal nitrate salts [Ref. 1].

The inventory of TRU waste currently stored at the WCS facility is discussed in Section 3, Section 4 presents an overview of the safety hazards of nitric acid and/or metal nitrate salts with cellulose (Section 4.1) and starch based kitty litter (Section 4.2), and the safety strategy for the latter is discussed in Section 5.

3.0 TRU Waste Currently Stored at WCS

Having previously shipped to WIPP Type 1 TRU waste that had been stored above ground at the WCS facility [Ref. 3], the remaining TRU waste from LANL currently residing at the WCS facility (ignoring dunnage) consists of: 1) five Type 2 55-gallon containers in separate SWBs located aboveground in the Container Storage Building (CSB); and 2) a total of 258 55-gallon containers nested within 74 SWBs that were placed into MCCs and buried below grade under a shallow layer of sand in the FWF. All but three of the 74 SWBs contain at least one drum of Type 3 waste (113 drums of this type in total), with most of the remainder (again, ignoring dunnage) comprising Type 1 waste, apart from two of the SWBs containing single drums of Type 2 waste. While the designation of Type 2 waste does not unambiguously establish that this waste contains the starch based kitty litter that was present in Drum 68660, for the purposes of this document this connection is conservatively assumed. Further details regarding the population of Type 2 and Type 3 containers stored at WCS are provided in Attachment A.

4.0 Understanding Nitrate Chemistry – The Key to Safer and More Efficient TRU Waste Acceptance

A previous report [Ref. 1] laid out the mechanistic details underlying the complex redox cycle that interconverts various oxidation states of nitrogen, and identified the important reactants from this cycle that carry out the aqueous phase oxidation of alcohols and related organic functional groups that make up polymeric carbohydrates (i.e., polysaccharides) such as starches and cellulose. These exothermic reactions, coupled with a positive feedback loop inherent to nitrogen redox chemistry, can initiate an *autocatalytic thermal runaway* under certain oxidizing (i.e., fuel-lean) conditions with potentially explosive gas generation, particularly if the reactions are initially suppressed by an induction period whose termination abruptly intensifies the autocatalytic cycle. This ambient temperature phenomenon, augmented by metal nitrate salts that release nitric acid into the system *via* hydrolysis (cf. traditional oxidizer properties of these salts, which operate in the solid state at elevated temperatures), *poses the most significant risk where acidic solution may be present* in small quantities as free liquid or sorbed within a solid matrix of a TRU waste drum (i.e., no visible free liquid), as occurred in the WIPP release.

4.1 Safety Evaluation of Cellulose with Nitric Acid

This fundamental understanding (i.e., at the molecular level) of the specific role of nitrogen redox chemistry in initiating an autocatalytic cycle during polysaccharide oxidation, including the identity of the oxidation and reduction products formed, the effects of competing side-reactions and decomposition pathways, and how all of this in turn impacts gas generation, was applied toward an evaluation of the extensive literature – Department of Energy (DOE) reports

and peer reviewed articles – on the nitric acid oxidation of polysaccharides (mainly cellulose). From this, a safety strategy could be put forth for the safe disposition of TRU waste that contains cellulose-based materials commingled with nitric acid and/or metal nitrate salts.

One of the main conclusions drawn from this evaluation was that cellulose-based materials in intimate contact with nitric acid are not inherently prone to autocatalytic thermal runaway unless the conditions (mainly temperature) are pushed during "extreme" exothermic processes of denitration [Ref. 4] or the destructive oxidation of organic wastes [Ref. 5, 6]. Contrasting this seemingly innocuous behavior, the number of incidents connected to cellulose-based materials in contact with nitric acid that have been reported across the DOE complex can be explained by the input of *additional aggravating factors* such as confinement and/or the presence of other reactive constituents (e.g., flammable materials, 238-Pu). The observation that these incidents have invariably occurred *not* immediately during the exposure to nitric acid, but within a brief period after the cellulose material has been stored/discarded (typically within a day), indicates that a potent reactivity has been triggered by an additional factor, and speaks to the dangerous role that the induction period can play in nitrogen redox chemistry.

Due to the degree of uncertainty that encompasses many aspects of the TRU waste generation process, unless it can be demonstrated (e.g., by comprehensive documented acceptable knowledge) that effective process procedures have been followed that limit the acidity and sorbed volume to which cellulosic material has been exposed to nitric acid, and that the pH has been adjusted to between 2 and 12.5, it is not sufficiently conservative to state unequivocally that an autocatalytic cycle will be prevented in a TRU waste drum. However, while a potential hazard to the generator site may initially exist, the culmination of the safety evaluation is that a latency period (minimum of 200 days with a minimum mean daily temperature of 50 °F) could be established beyond which nitric acid stored with polysaccharide material *other than starch based kitty litter* (e.g., cellulosic rags, towels, etc.) in a TRU waste drum may no longer present a hazard. After this point, such waste is safe to ship to WIPP provided the safety measures outlined in Section 8.5 of Ref. 1 are followed.

4.2 Safety Evaluation of WCS Type 3 Waste

It is noteworthy that starch based kitty litter, the prime ingredient in the LANL RNS waste from which analogous drums stored at WCS were designated as Type 3, could *not* be included in the 200 day latency period described in Section 4.1. This exemption was necessary because of the prolonged duration in which nitric acid commingled with starch based kitty litter could potentially remain hazardous under ambient conditions. The most obvious example of this is the 72 day period (the possibility that the "real" latency is much shorter, being artificially inflated by initial storage in the cold winter temperatures experienced at LANL that would

have initially slowed all reactions, is discussed further below) spanning the time beginning with the assembly of Drum 68660 at LANL until its eruption in the WIPP mine. A less notable example is provided from surrogate drum tests conducted by LANL [Ref. 7], where Drum B underwent a muted autocatalytic cycle that left the drum intact after 12 days (a closed drum at 25 °C, the temperature climbed modestly to 33 °C; as expected, the latency is much shorter at higher initial temperature, as noted with surrogate Drums C and D, although even these extend beyond 3 days). The juxtaposition of this data point – along with that from drum 68660 – against all other reaction times plotted in Figure A3 of Ref. 1, is instructive, and demonstrates that while both fall within the 200 day limit set for other polysaccharide materials, the conservatively assumed latency for drum 68660 in particular is too long to leave sufficient margin for comfortable assurance.

The underlying reasons why starch based kitty litter is capable of such longer latency extend beyond the higher reactivity of starches relative to cellulose. Indeed, as discussed in Ref. 1, it is cellulose that is the outlier in being remarkably unreactive (evident even in processes like digestion) even relative to other polysaccharides, all of which in fact share a generally sluggish reactivity compared to simpler organic molecules like the monomeric carbohydrate glucose. This attribute includes not only starch but even the simplest disaccharide sugar sucrose, which is recognized as being measurably less reactive – i.e., more controllable – in denitration processes relative to formic acid. In this vein, the reactivity of nitric acid with starches is unremarkable, as discussed in Section 8.4 of Ref. 1 (with an example listed in entry #19 in Table 1 of that document). What makes the starch based kitty litter special could be the minor protein content (~ 14 % of the kitty litter, mainly gluten [Ref. 8]), given the known ability of nitric acid to oxidize amino acids [Ref. 9], the building blocks of protein molecules. More likely, however, it is the attendant microbial population (probably essential to the commercial purpose of kitty litter), which adds a layer of biochemical processes (e.g., fermentation, as demonstrated in Sandia National Laboratories (SNL) surrogate drum A [Ref. 10], with water the only added ingredient) that can supplement standard chemical reactions [Ref. 8].

Regardless, the anomalous reactivity of starch based kitty litter with nitric acid and/or metal nitrate salts is readily demonstrated, as discussed in the note to item #60 in Table 1 of Ref. 1, where for example even freshly prepared mixtures of kitty litter and 3.5 N nitric acid show immediate signs of reactivity [Ref. 11]. With starch based kitty litter used as a bulk sorbent, a greater mass of the more reactive polysaccharide relative to the quantities of cellulose that are typically present in TRU waste drums presents an important scale effect (i.e., a greater hazard from a higher fuel content) [Ref. 1].

Commingled with nitric acid and metal nitrate salts (which can significantly lower the solution pH as discussed in Section 5.4 of Ref. 1), the resulting RNS waste is a potent reactive mixture.

The use of an organic neutralizing agent triethanolamine simply adds more fuel to the mix [Ref. 11] — the exothermic reactivity of this small triol with nitric acid was reported during neutralization operations at the Waste Characterization, Reduction, and Repackaging Facility (WCRRF) [Ref. 12]. The inherent reactivity of this RNS combination has been replicated in a narrow suite of tests performed on surrogate materials that modeled the mixture present in drum 68660 [Ref. 13, 14], which consistently showed lowered thermal onset temperatures, especially under adiabatic conditions (emphasizing the role of a closed system, as is similarly noted for cellulose-based systems [Ref. 4]).

Other examples of this facile reactivity come from the nonequilibrium steady state evolution of N₂O and CO₂ (indicative of oxidation and subsequent decarboxylation – see Section 6 of Ref. 1 for details) observed under ambient conditions from surrogate drum tests conducted by SNL [Ref. 10] and from RNS drums stored for over 3 years at LANL [Ref. 14]. In the 10-gallon drum SNL tests, gases appeared within 3 days but dissipated after ~ one month. In the larger 55-gallon TRU waste drums containing RNS stored at LANL, gas appeared as soon as measurements were obtained (i.e., reactivity was likely initiated soon after the drums were filled) [Ref. 15] and the emission of N₂O and CO₂ continued at seasonally adjusted steady state levels for over three years until the drums were repackaged. It is worth noting, however, that gas levels overall were trending downwards in the RNS drums [Ref. 16, 17], as expected in a finite system undergoing gradual fuel depletion (the same process consumed the smaller content in SNL drums over a shorter duration). Notably, neither the SNL surrogate drums nor the LANL RNS drums displayed overt signs of thermal activity.

For starch based kitty litter commingled with nitric acid in RNS/Type 3 waste, it appears that its inherent reactivity (i.e., stimulated even at relatively low acidity) is manifested in one of two ways depending on conditions (mainly temperature and pressure) in the drum:

1) In open (i.e., vented) drums under ambient temperatures, slow steady state gas generation with minimal self-heating is observed that continues so long as it can be sustained – examples are provided by the RNS drums in storage at LANL and the Type 2 drums stored aboveground at WCS since 2014, from which headspace gas measurements have been obtained. This also includes the SNL 10-gallon surrogate drums [Ref. 10], some of which were actually closed systems but presumably contained insufficient energy content, relative to the ability of these smaller drums to dissipate heat, to initiate an autocatalytic cycle (notably, all of these tests were run under ambient temperatures). Under ambient temperatures (i.e., in the absence of an external heat source) the vast majority of Type 3 drums stored at WCS do NOT pose a risk of autocatalytic thermal runaway;

2) In closed systems and/or elevated temperature, a very select few drums *are capable of initiating an autocatalytic cycle that may lead to thermal runaway* – LANL surrogate drums C and D [Ref. 7] represent examples of the dual hazard of a closed system and high (> 60 °C) initial temperature. Both drums underwent a thermal runaway, although notably it dissipated in drum C when off-gassing unblocked the vent, once again highlighting the importance of a closed system. These systems contrast against LANL surrogate drums A (open system at 60 °C, after a temperature reset) and B (closed system at 25 °C), which both experienced an autocatalytic cycle but neither ramped up to a thermal runaway.

Among 671 RNS drums – 507 of them previously deposited in WIPP – drum 68660 is the only one known to have undergone thermal runaway at a scale sufficient to breach confinement. While special circumstances specific to this drum seem to have applied based on the second bullet above (i.e., in the absence of external heating, among other potential factors a closed system is highly suggestive [Ref. 17]), a bounding latency period for Type 3 drums at WCS can still be established as has been done for other polysaccharide materials. The basis for this is that while the RNS/Type 3 waste is more reactive (i.e., at lower acidity) relative to other polysaccharide materials, which prolongs the possible range of latency where a TRU waste drum may conservatively be assumed to remain potentially hazardous, the underlying chemistry remains the same for both cellulose and Type 3 based systems - i.e., both are predicated on instigating the nitrogen redox cycle towards an autocatalytic thermal runaway. This correlation of a latency to the nitrogen redox cycle and its associated induction period, with its integration into polysaccharide oxidation and degradation, is supported by aging studies conducted on the most reactive RNS surrogate materials [Ref. 17], which suggest that the onset temperature reaches a minimum (i.e., optimal conditions exist for thermal runaway) after a few weeks, with the potential for runaway gradually diminishing thereafter.

There is some debate regarding the latency in drum 68660, which may refer to either the 72 day period back to when the drum was configured, or a much shorter < 14 day timeframe during which the drum was emplaced in the mine. The latter ignores the interim while the drum sat in the cold winter temperatures at Los Alamos, during which much of the latent reactivity would have been suspended (the similarity of this shorter latency to that of LANL surrogate Drum B has been noted [Ref. 3, 7]). Nevertheless, conservatively assuming the 72 day latency and applying the same ten-fold safety margin as previously adopted for other polysaccharide materials, TRU waste containing starch based kitty litter at the WCS facility would be *deemed safe after being stored for approximately two years* (with a minimum mean daily temperature of 50 °F to which the waste has been exposed). In this case, either the Type 3 drums have sufficient energy density and have already undergone an autocatalytic reaction (which may or

may not have been enough to breach the drum), or they do not (in which case they continue to undergo steady state reactivity at low levels).

5.0 Safety Strategy

With fire prevention controls [Ref. 18] credited to prevent external heating of a TRU waste drum, an event that may exceed the WIPP safety basis (i.e., with high consequences to the facility worker) is rendered extremely unlikely for TRU waste sent from WCS on the following basis:

- 1) TRU waste drums have been sitting at the WCS facility for more than six years i.e., well in excess of the conservative two-year latency period discussed in Section 4.2. At this prolonged duration after the contents of the waste drum have been filled, having already had the opportunity for heterogeneous contents to "reset" through shifting during transport from LANL and subsequent loading and burial into MCCs, and further subjected repeatedly to hot summertime temperatures especially during the early part of the first summer in 2014 [Ref. 3] when the black-coated MCCs were initially stored aboveground and exposed to direct sunlight (indeed, anomalously high temperature readings from thermocouples inside the MCCs relative to the outside air temperature prompted the decision to have the containers buried in the shallow underground) the opportunity for ambient conditions to initiate an autocatalytic cycle would have been exhausted.
- 2) Headspace gas analysis acquired towards the end of 2017 from SWBs containing Type 1 and Type 2 drums (i.e., the latter potentially containing starch based kitty litter) located aboveground showed nonequilibrium steady state levels of N₂O and CO₂ (each drum showing its own signature gas concentrations according to its makeup) consistent with the description in Section 6 of Ref. 1. This aligns with measurements from RNS waste stored at LANL over a three year period until the drums were repackaged, where decreased gas output over that time, accounting for seasonal variation, reflects steady depletion of the remaining reactants. The same gradual depletion would have occurred to the analogous Type 3 waste during its interim storage at WCS.

Additional defense-in-depth for the above items comes primarily from maintaining an open (i.e., vented) system, which prevents both pressure buildup and allows the "voiding" of reactive gases (e.g., NO, NO₂) that would otherwise remain to contribute toward a potential autocatalytic cycle. The importance of maintaining an open system [Ref. 3, 7] has also been stressed in the prevention of the red oil hazard that exists in Plutonium Uranium Redox Extraction (PUREX) processes [Ref. 19], which represents an analogous autocatalytic thermal runaway hazard at an industrial scale (the context of this hazard relative to TRU waste drums is discussed in Section 8.2 of Ref. 1). All TRU waste drums are equipped with a filter vent, although they are not formally credited for safety and

therefore are not monitored or maintained as part of management measures for safety items [Ref. 20]. The most likely scenario that could generate the observed temperature and gas output from the constituents of drum 68660, without a drastically higher acidity than reported, is a closed system. This context provides additional rationale for the fact that other drums with configurations similar to drum 68660 did not undergo a similar scale autocatalytic thermal runaway.

Other than opting to keep the TRU waste at WCS, sending it to WIPP provides the least hazard with respect to transportation based on the short distance and the logistics involved with such an operation.

6.0 Conclusions

113 TRU drums presently stored at the WCS facility contain potentially hazardous metal nitrate salts commingled with oxidizable starch based kitty litter. This Type 3 waste, currently stored in SWBs that were placed into MCCs and buried below grade under a shallow layer of sand in the FWF, is equivalent to RNS waste from LANL that was implicated in the radiological release at WIPP and poses the main hazard for TRU waste stored at the WCS facility.

With the starch based kitty litter presenting a higher degree of reactivity relative to other polysaccharides such as cellulose, a longer latency period could nonetheless be established beyond which Type 3 waste drums may no longer present a hazard. Conservatively assuming the 72 day latency associated with drum 68660 and applying the same ten-fold safety margin as previously adopted for other polysaccharide materials, Type 3 waste at the WCS facility would be *deemed safe after being stored for approximately two years* (with a minimum mean daily temperature of 50 °F to which the waste has been exposed).

7.0 References

- 1. Duval, P.B., LA-UR-18-27835 (Rev. 2), Safety Evaluation of Nitric Acid Reactions with Polysaccharides, 2020, Los Alamos National Laboratory, Los Alamos NM.
- 2. Plan for Disposition of LANL TRU Waste in Storage at WCS, DOE/WCS, 2016.
- 3. DE-DT0012903 (Rev. 2), Feasibility Study for TRU Waste Containers Stored at Waste Control Specialists, U.S. Department of Energy EM Los Alamos Field Office, 2018, Los Alamos NM.
- 4. Scheele, R.D.; McNamara, B.K.; Bagaasen, L.M.; Bos, S.J.; Kozelisky, A.E.; Berry, P.K., PNNL-16677, Evaluation of Exothermic Reactions from Bulk-Vitrification Melter Feeds Containing Cellulose, 2007, Pacific Northwest National Laboratory, Richland WA.
- 5. Smith, J.R., WSRC-MS-93-169, *Air-Nitric Acid Destructive Oxidation of Organic Wastes*, 1993, Westinghouse Savannah River Company, Aiken SC.

- 6. Pierce, R.A.; Smith, J.R., WSRC-MS-95-0080, *Nitric-Phosphoric Acid Oxidation of Organic Waste Materials*, 1993, Westinghouse Savannah River Company, Aiken SC.
- 7. Parker, G.R.; Holmes, M.D.; Heatwole, E.M.; Leonard, P.; Leibman, C.P., LA-CP-16-20038, *Drum-Scale Testing of the Thermolytic Response of a Remediated Nitrate Salts (RNS) Surrogate Waste Mixture*, 2016, Los Alamos National Laboratory, Los Alamos NM.
- 8. SRNL-RP-2014-01198, Waste Isolation Pilot Plant Technical Assessment Team Report, 2014.
- 9. Kuwahara, H.; Eto, M.; Kawamoto, Y.; Kurihara, H.; Kaneko, T.; Obayashi, Y.; Kobayashi, K. Orig. Life Evol. Biosph. **2012**, 42, 533, The Use of Ascorbate as an Oxidation Inhibitor in Prebiotic Amino Acid Synthesis: A Cautionary Note.
- 10. Rosenberg, D., SAND2015-0866 R, *Sub-Scale Drum Test Memo*, 2015, Sandia National Laboratories, Albuquerque NM.
- 11. Scheele, R.D.; McNamara, B.K.; Hobbs, D.T.; Schwantes, J.M.; Minette, M.J.; Barrett, C.A., PNNL-24125, *Probative Investigation of the Thermal Stability of Wastes Involved in February 2014 WIPP Waste Drum Breach*, 2015, Pacific Northwest National Laboratory, Richland WA.
- 12. Accident Investigation Report, Phase 2, Radiological Release at the Waste Isolation Pilot Plant, U.S. Department of Energy Office of Environmental Management, 2015.
- 13. Funk, D.J., LA-UR-16-24408, Summary of Remediated and Unremediated Nitrate Salt Surrogate Testing in Support of the Waste Treatment Permit Application to the New Mexico Environment Department, 2016, Los Alamos National Laboratory, Los Alamos NM.
- 14. Funk, D.J., LA-UR-16-21640, Technical Basis for the Removal of Unremediated Nitrate Salt Sampling (UNS) to Support LANL Treatment Studies, 2016, Los Alamos National Laboratory, Los Alamos NM.
- 15. Robinson, B.A.; Leibman, C.P., LA-UR-15-22661, Interpretation of Headspace Gas Observations in Remediated Nitrate Salt Waste Containers Stored at Los Alamos National Laboratory, 2015, Los Alamos National Laboratory, Los Alamos NM.
- 16. Funk, D.J., EM2016-5229 (Rev. 1), Use of Lower Temperatures to Provide Protection for Remediated Nitrate Salt (RNS) During Handling and Transportation to WCRRF, 2016, Los Alamos National Laboratory, Los Alamos NM.
- 17. Funk, D.J., LA-UR-16-21760, *The Path to Nitrate Salt Disposition*, 2016, Los Alamos National Laboratory, Los Alamos NM.
- 18. DOE/WIPP 07-3372 (Rev. 6a), Waste Isolation Pilot Plant Documented Safety Analysis, Nuclear Waste Partnership LLC, 2016, Carlsbad, NM.
- 19. DNFSB/TECH-33, Control of Red Oil Explosions in Defense Nuclear Facilities, Defense Nuclear Facilities Safety Board Technical Report, 2003.
- 20. Norris, T.L.; Burns, T.P.; Gatliffe, T.R. LA-UR-97-1108, *Rocky Flats Environmental Technology Site Residue Prestabilization Monitoring Plan*, 1997, Los Alamos National Laboratory, Los Alamos NM.

- 21. Bishop, L. (2018). Feasibility Study Overview for the Removal of Los Alamos National Laboratory Type 3 Waste from Waste Control Specialists. U.S. DOE Office of Environmental Management, Los Alamos, NM.
- 22. Nuclear Waste Partnership. (2017). *Containers at WCS Breakdown 081417*. Waste Isolation Pilot Plant, Carlsbad, NM.

Attachment A

Type 2 & Type 3 Waste Stored at WCS

Table of Type 2 & Type 3 Waste Stored at WCS [Ref. 3, 21, 22]

The seven Type 2 and 113 Type 3 waste containers listed in the table below are grouped according to the SWB they are stored in, which are identified by the Overpack Number by which this table is sorted (note alternate shading separating entries in different SWBs). All but five of these SWBs are stored in MCC casks located below grade in the FWF (the remainder, each containing one Type 2 container identified by an asterisk (*), are stored aboveground in the CSB).

In addition to the Container Number and Overpack Number, this table identifies for each waste container the Container Type (i.e., 55-gallon drum versus Pipe Overpack Component (POC)), the LANL waste stream from which the container originated, the Waste Type (i.e., 2 versus 3), the Nonconformance Report (NCR) Identification (ID) number and Resource Conservation and Recovery Act (RCRA) or Documented Safety Analysis (DSA) condition under which the NCR was issued (i.e., which currently prohibits the container from being shipped to WIPP), the Real-Time Radiography (RTR) Batch Data Record (BDR) number (from which information on the container contents can be obtained), and a brief description of the contents of the container.

Container Number	Container Type	Waste Stream Profile	Overpack Number	Waste Type	NCR ID Number	NCR Condition	RTR BDR Number	Contents
LA00000068426	POC	LA-MIN02-V.001	LASB02166	3	NCR-LANL-0128-16, NCR-LANL-0486-17	D001, POC Combustible	LA-RTR2-13-0119	Plastic sheeting, homogeneous solids
LA00000068315	55 gal	LA-MIN02-V.001	LASB02204	3	NCR-LANL-0128-16	D001	LA-HERTR-13- 0101	Scrap lead, plastic bag, 90 mil liner lid, homogeneous solids
LA00000068656	55 gal	LA-MIN02-V.001	LASB02206	3	NCR-LANL-0128-16	D001	LA-RTR2-13-0132	Scrap lead, leaded rubber gloves, plastic bags, plastic lid, homogeneous solids
LA00000068620	POC	LA-MIN02-V.001	LASB50002	3	NCR-LANL-0128-16, NCR-LANL-0486-17	D001, POC Combustible	LA-RTR2-13-0128	Plastic bags, homogeneous solids
LA00000069191	POC	LA-MIN02-V.001	LASB50002	3	NCR-LANL-0128-16, NCR-LANL-0486-17	D001, POC Combustible	LA-HERTR-14- 0009	Plastic bag, homogeneous solids
LA00000068676	55 gal	LA-MIN02-V.001	LASB50005	3	NCR-LANL-0128-16	D001	LA-RTR2-13-0132	Scrap metal, scrap lead, plastic bags, plastic lid, homogeneous solids
LA00000069235	55 gal	LA-MIN04-S.001	LASB50006	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0010	Scrap lead, plastic bag, homogeneous solids
LA00000069209	55 gal	LA-MIN02-V.001	LASB50010	3	NCR-LANL-0128-16	D001	LA-HERTR-14- 0008	Scrap metal, metal hardware, scrap lead,

Container Number	Container Type	Waste Stream Profile	Overpack Number	Waste Type	NCR ID Number	NCR Condition	RTR BDR Number	Contents
								plastic bags, liner lid, homogeneous solids
LA00000068314	55 gal	LA-MIN02-V.001	LASB50012	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0007	Tape roll, plastic bag, 90 mil liner lid, homogeneous solids
LA00000069068	55 gal	LA-MIN02-V.001	LASB50012	3	NCR-LANL-0128-16	D001	LA-RTR2-13-0140	Hardware, rubber gloves, plastic bags, liner lid, homogeneous solids
LA00000068625	55 gal	LA-MIN02-V.001	LASB50013	3	NCR-LANL-0128-16	D001	LA-RTR2-13-0128	Scrap lead, plastic bags, homogeneous solids
LA00000068632	55 gal	LA-MIN02-V.001	LASB50013	3	NCR-LANL-0128-16	D001	LA-RTR2-13-0128	Scrap metal, scrap lead, tape rolls, plastic bags, homogeneous solids
LA00000069217	55 gal	LA-MIN02-V.001	LASB50014	3	NCR-LANL-0128-16	D001	LA-HERTR-14- 0009	Hardware, scrap metal, scrap lead, tape roll, plastic bags, homogeneous solids
LA00000069067	55 gal	LA-MIN02-V.001	LASB50015	3	NCR-LANL-0128-16	D001	LA-RTR2-13-0138	Scrap metal, scrap lead, plastic bag, homogeneous solids
LA00000068429	POC	LA-MIN02-V.001	LASB50017	3	NCR-LANL-0128-16, NCR-LANL-0486-17	D001, POC Combustible	LA-RTR2-13-0123	Homogeneous solids
LA00000068433	POC	LA-MIN02-V.001	LASB50017	3	NCR-LANL-0128-16, NCR-LANL-0486-17	D001, POC Combustible	LA-RTR2-13-0129	Plastic bag, homogeneous solids
LA00000068509	POC	LA-MIN02-V.001	LASB50018	3	NCR-LANL-0128-16, NCR-LANL-0486-17	D001, POC Combustible	LA-RTR2-13-0138	Homogeneous solids
LA00000069087	POC	LA-MIN02-V.001	LASB50018	3	NCR-LANL-0128-16, NCR-LANL-0486-17	D001, POC Combustible	LA-RTR2-14-0002	Scrap metal, homogeneous solids
LA00000069188	POC	LA-MIN02-V.001	LASB50018	3	NCR-LANL-0128-16, NCR-LANL-0486-17	D001, POC Combustible	LA-RTR2-14-0007	Plastic bag, homogeneous solids
LA00000068342	POC	LA-MIN02-V.001	LASB50019	3	NCR-LANL-0128-16, NCR-LANL-0486-17	D001, POC Combustible	LA-RTR2-14-0007	Plastic bags, homogeneous solids
LA00000068584	POC	LA-MIN02-V.001	LASB50019	3	NCR-LANL-0128-16, NCR-LANL-0486-17	D001, POC Combustible	LA-RTR2-13-0128	Plastic bags, homogeneous solids
LA00000069103	POC	LA-MIN02-V.001	LASB50019	3	NCR-LANL-0128-16, NCR-LANL-0486-17	D001, POC Combustible	LA-RTR2-13-0140	Scrap lead, plastic bags, homogeneous solids
LA00000068341	POC	LA-MIN02-V.001	LASB50020	3	NCR-LANL-0128-16, NCR-LANL-0486-17	D001, POC Combustible	LA-RTR2-13-0111	Scrap lead, homogeneous solids

Container Number	Container Type	Waste Stream Profile	Overpack Number	Waste Type	NCR ID Number	NCR Condition	RTR BDR Number	Contents
LA00000069187	POC	LA-MIN02-V.001	LASB50020	3	NCR-LANL-0128-16, NCR-LANL-0486-17	D001, POC Combustible	LA-RTR2-14-0007	Plastic bag, homogeneous solids
LA00000069085	POC	LA-MIN02-V.001	LASB50021	3	NCR-LANL-0128-16, NCR-LANL-0486-17	D001, POC Combustible	LA-RTR2-14-0005	Scrap metal, plastic bag, homogeneous solids
LA00000068580	55 gal	LA-MIN02-V.001	LASB50025	3	NCR-LANL-0128-16	D001	LA-HERTR-13- 0119	Scrap lead, leaded rubber gloves, plastic bags, plastic lid, homogeneous solids
LA00000069179	55 gal	LA-MIN02-V.001	LASB50025	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0005	Hardware, utility knife, scrap lead, plastic bags, liner lid, homogeneous solids
LA00000068347	POC	LA-MIN02-V.001	LASB50026	3	NCR-LANL-0128-16, NCR-LANL-0486-17	D001, POC Combustible	LA-RTR2-13-0112	Plastic bags, homogeneous solids
LA00000069034	55 gal	LA-MIN02-V.001	LASB50027	3	NCR-LANL-0128-16	D001	LA-RTR2-13-0135	Hardware, scrap metal, closure ring, hand tools, utility knife, plastic bags, liner lid, plastic container, homogeneous solids
LA00000068428	POC	LA-MIN02-V.001	LASB50028	3	NCR-LANL-0128-16, NCR-LANL-0486-17	D001, POC Combustible	LA-RTR2-13-0123	Plastic bags, homogeneous solids
LA00000068543	55 gal	LA-MIN02-V.001	LASB50031	3	NCR-LANL-0128-16	D001	LA-RTR2-13-0120	Scrap lead, plastic bags, liner lid, homogeneous solids
LA00000069077	55 gal	LA-MIN02-V.001	LASB50032	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0002	Scrap metal, hand tool, scrap lead, leather gloves, plastic bags, plastic liner lid, homogeneous solids
LA00000069195	55 gal	LA-MIN02-V.001	LASB50032	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0007	Scrap lead, homogeneous solids
LA00000069066	55 gal	LA-MIN02-V.001	LASB50033	3	NCR-LANL-0128-16	D001	LA-RTR2-13-0138	Scrap lead, plastic bags, homogeneous solids
LA00000069181	55 gal	LA-MIN02-V.001	LASB50033	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0005	Scrap metal, plastic bags, homogeneous solids
LA00000069234	55 gal	LA-MIN02-V.001	LASB50034	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0010	Scrap lead, liner lid, plastic bags, homogeneous solids
LA00000069430	55 gal	LA-MIN02-V.001	LASB50034	3	NCR-LANL-0128-16	D001	LA-HERTR-14- 0030	Scrap lead, plastic bags, homogeneous solids

Container Number	Container Type	Waste Stream Profile	Overpack Number	Waste Type	NCR ID Number	NCR Condition	RTR BDR Number	Contents
LA00000069061	55 gal	LA-MIN02-V.001	LASB50035	3	NCR-LANL-0128-16	D001	LA-RTR2-13-0138	Scrap lead, plastic bag, homogeneous solids
LA00000069161	55 gal	LA-MIN02-V.001	LASB50035	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0007	Plastic bag, 90 mil liner lid, homogeneous solids
LA00000068425	POC	LA-MIN02-V.001	LASB50036	3	NCR-LANL-0128-16, NCR-LANL-0486-17	D001, POC Combustible	LA-RTR2-13-0123	Hardware, scrap lead, homogeneous solids
LA00000068432	POC	LA-MIN02-V.001	LASB50037	3	NCR-LANL-0128-16, NCR-LANL-0486-17	D001, POC Combustible	LA-RTR2-13-0129	Plastic bag, homogeneous solids
LA00000068583	POC	LA-MIN02-V.001	LASB50037	3	NCR-LANL-0128-16, NCR-LANL-0486-17	D001, POC Combustible	LA-RTR2-13-0125	Homogeneous solids
LA00000069182	55 gal	LA-MIN02-V.001	LASB50037	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0005	Utility knife, scrap lead, plastic bags, homogeneous solids
LA00000069213	55 gal	LA-CIN01.001	LASB50037	2	NCR-LANL-0128-16	D001	LA-RTR2-14-0010	Scrap metal, leather gloves, plastic bags, homogeneous solids
LA00000068617	POC	LA-MIN02-V.001	LASB50039	3	NCR-LANL-0128-16, NCR-LANL-0486-17	D001, POC Combustible	LA-RTR2-13-0128	Scrap lead, homogeneous solids
LA00000069043	55 gal	LA-MIN02-V.001	LASB50039	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0007	Plastic bags, homogeneous solids
LA00000069177	55 gal	LA-MIN02-V.001	LASB50039	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0005	Hardware, plastic bags, liner lid, homogeneous solids
LA00000069295	55 gal	LA-MIN02-V.001	LASB50040	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0014	Hardware, scrap lead, leather gloves, plastic bags, plastic lid, homogeneous solids
LA00000069193	55 gal	LA-MIN02-V.001	LASB50041	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0007	Leaded rubber gloves, plastic bag, 90 mil liner lid, homogeneous solids
LA00000069185	POC	LA-MIN02-V.001	LASB50043	3	NCR-LANL-0128-16, NCR-LANL-0486-17	D001, POC Combustible	LA-RTR2-14-0005	Plastic bag, homogeneous solids
LA00000069492	55 gal	LA-MIN02-V.001	LASB50043	3	NCR-LANL-0128-16	D001	LA-HERTR-14- 0030, LA-HERTR-14- 0030QTR	Hardware, plastic bags, 90 mil liner lid, homogeneous solids

Container Number	Container Type	Waste Stream Profile	Overpack Number	Waste Type	NCR ID Number	NCR Condition	RTR BDR Number	Contents
LA00000068325	POC	LA-MIN02-V.001	LASB50045	3	NCR-LANL-0128-16, NCR-LANL-0486-17	D001, POC Combustible	LA-RTR2-13-0110	Homogeneous solids
LA00000069105	POC	LA-MIN02-V.001	LASB50045	3	NCR-LANL-0128-16, NCR-LANL-0486-17	D001, POC Combustible	LA-RTR2-14-0005	Scrap lead, homogeneous solids
LA00000069422	55 gal	LA-MIN02-V.001	LASB50045	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0027	Scrap lead, homogeneous solids
LA00000068661	55 gal	LA-MIN02-V.001	LASB50046	3	NCR-LANL-0128-16	D001	LA-RTR2-13-0135	Scrap lead, plastic bags, liner lid, homogeneous solids
LA00000069196	55 gal	LA-MIN02-V.001	LASB50046	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0007	Tape roll, rubber gloves, plastic bags, homogeneous solids
LA00000068431	POC	LA-MIN02-V.001	LASB50048	3	NCR-LANL-0128-16, NCR-LANL-0486-17	D001, POC Combustible	LA-RTR2-13-0130	Plastic bags, homogeneous solids
LA00000069102	POC	LA-MIN02-V.001	LASB50048	3	NCR-LANL-0128-16, NCR-LANL-0486-17	D001, POC Combustible	LA-RTR2-14-0003	Plastic bag, homogeneous solids
LA00000069081	55 gal	LA-MIN02-V.001	LASB50052	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0002	Scrap metal, plastic bag, homogeneous solids
LA00000069158	55 gal	LA-MIN02-V.001	LASB50055	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0006	Scrap lead, plastic bag, homogeneous solids
LA00000069163	55 gal	LA-MIN02-V.001	LASB50057	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0006	Plastic bags, 90 mil liner lid, homogeneous solids
LA00000069216	55 gal	LA-MIN02-V.001	LASB50057	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0010	Scrap lead, leather gloves, homogeneous solids
LA00000069402	55 gal	LA-MIN02-V.001	LASB50057	3	NCR-LANL-0128-16	D001	LA-HERTR-14- 0030	Scrap lead, plastic bags, 90 mil liner lid, homogeneous solids
LA00000068681	55 gal	LA-MIN02-V.001	LASB50058	3	NCR-LANL-0128-16	D001	LA-RTR2-13-0138	Hand tool, closure ring, hardware, scrap metal, liner lid, homogeneous solids
LA00000069069	55 gal	LA-MIN02-V.001	LASB50058	3	NCR-LANL-0128-16	D001	LA-RTR2-13-0140	Scrap metal, scrap lead, rubber gloves, plastic bags, homogeneous solids
LA00000068627	55 gal	LA-MIN02-V.001	LASB50059	3	NCR-LANL-0128-16	D001	LA-RTR2-13-0129	Scrap lead, plastic bags, 90 mil liner lid, homogeneous solids

Container Number	Container Type	Waste Stream Profile	Overpack Number	Waste Type	NCR ID Number	NCR Condition	RTR BDR Number	Contents
LA00000069154	55 gal	LA-MIN02-V.001	LASB50061	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0002	Scrap lead, plastic bag, homogeneous solids
LA00000092900	55 gal	LA-MHD01.001	LASB50061	3	NCR-LANL-0128-16	D001	LA-RTR2-13-0063, LA-RTR2-13-0136	Hardware, metal lid, scrap lead, fiberboard liner sleeve, fiberboard, liner lid, plastic bag, homogeneous solids
LA00000068686	55 gal	LA-MIN02-V.001	LASB50062	3	NCR-LANL-0128-16	D001	LA-RTR2-13-0135	Scrap lead, plastic bags, homogeneous solids
LA00000069073	55 gal	LA-MIN02-V.001	LASB50062	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0002	Scrap metal, hand tool, leather gloves, plastic bags, homogeneous solids
LA00000069091	55 gal	LA-MIN02-V.001	LASB50062	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0009	Scrap metal, plastic sheeting, 90 mil liner lids, homogeneous solids
LA00000069033	55 gal	LA-MIN02-V.001	LASB50063	3	NCR-LANL-0128-16	D001	LA-RTR2-13-0135	Scrap lead, leather gloves, homogeneous solids
LA00000069097	55 gal	LA-MIN02-V.001	LASB50063	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0006	Drum rings, scrap lead, plastic bags, 90 mil liner lid, homogeneous solids
LA00000069232	55 gal	LA-MIN04-S.001	LASB50063	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0009	Scrap metal, scrap lead, homogeneous solids
LA00000069282	55 gal	LA-MIN02-V.001	LASB50064	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0014	Scrap lead, plastic bags, plastic lid, homogeneous solids
LA00000069162	55 gal	LA-MIN02-V.001	LASB50066	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0005	Scrap metal, scrap lead, tape roll, plastic bags, liner lid, homogeneous solids
LA00000069237	55 gal	LA-MIN02-V.001	LASB50066	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0009	Scrap lead, homogeneous solids
LA00000068350	POC	LA-MIN02-V.001	LASB50067	3	NCR-LANL-0128-16, NCR-LANL-0486-17	D001, POC Combustible	LA-RTR2-13-0112	Homogeneous solids
LA00000069229*	55 gal	LA-CIN01.001	LASB50070	2	NCR-LANL-0128-16	D001	LA-RTR2-14-0009	Scrap metal, cans with material, homogeneous solids

Container Number	Container Type	Waste Stream Profile	Overpack Number	Waste Type	NCR ID Number	NCR Condition	RTR BDR Number	Contents
LA00000069045	55 gal	LA-MIN02-V.001	LASB50071	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0002	Scrap metal, scrap lead, leather gloves, plastic bags, homogeneous solids
LA00000093525	55 gal	LA-CIN01.001	LASB50071	2	NCR-LANL-0128-16	D001	LA-RTR2-13-0062	Metal cans with material, metal lids, scrap lead, plastic bags, homogeneous solids
LA00000068449	55 gal	LA-MIN02-V.001	LASB50072	3	NCR-LANL-0128-16	D001	LA-HERTR-13- 0119	Scrap lead, leather glove, plastic bags, homogeneous solids
LA00000069230	55 gal	LA-CIN01.001	LASB50072	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0009	Scrap metal, homogeneous solids
LA00000069159	55 gal	LA-MIN02-V.001	LASB50074	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0005	Scrap lead, liner lid, plastic bags, homogeneous solids
LAS860020*	55 gal	LA-CIN01.001	LASB50075	2	NCR-LANL-0128-16	D001, D002	LA-HERTR-12- 0097	Metal cans with material, plastic bags, homogeneous solids
LA00000068619	POC	LA-MIN02-V.001	LASB50079	3	NCR-LANL-0128-16, NCR-LANL-0486-17	D001, POC Combustible	LA-RTR2-13-0132	Homogeneous solids
LA00000069493	55 gal	LA-MIN02-V.001	LASB50081	3	NCR-LANL-0128-16	D001	LA-HERTR-14- 0030	Scrap lead, plastic bags, homogeneous solids
LA00000068628	55 gal	LA-MIN02-V.001	LASB50082	3	NCR-LANL-0128-16	D001	LA-RTR2-13-0128	Scrap lead, plastic bags, homogeneous solids
LA00000069210	55 gal	LA-MIN02-V.001	LASB50082	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0007	Scrap lead, plastic bag, plastic sheeting, homogeneous solids
LA00000068546	55 gal	LA-MIN02-V.001	LASB50083	3	NCR-LANL-0128-16	D001	LA-RTR2-13-0120	Scrap lead, plastic bags, homogeneous solids
LA00000068311	55 gal	LA-MIN02-V.001	LASB50086	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0007	Metal lid, tape rolls, plastic bags, homogeneous solids
LA00000094201	55 gal	LA-CIN01.001	LASB50086	3	NCR-LANL-0128-16	D001	LA-RTR2-13-0103	Scrap lead, leaded rubber gloves, plastic bags, plastic containers, homogeneous solids
LA00000069074	55 gal	LA-MIN02-V.001	LASB50087	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0002	Scrap metal, plastic bag, plastic sheeting, homogeneous solids

Container Number	Container Type	Waste Stream Profile	Overpack Number	Waste Type	NCR ID Number	NCR Condition	RTR BDR Number	Contents
LA00000069194	55 gal	LA-MIN02-V.001	LASB50088	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0007	Drum ring, leather gloves, plastic bags, 90 mil liner lids, homogeneous solids
LA00000069064	55 gal	LA-MIN02-V.001	LASB50089	3	NCR-LANL-0128-16	D001	LA-RTR2-13-0140	Scrap lead, plastic bags, liner lid, plastic container, homogeneous solids
LA00000068508	POC	LA-MIN02-V.001	LASB50094	3	NCR-LANL-0128-16, NCR-LANL-0486-17	D001, POC Combustible	LA-RTR2-13-0130	Homogeneous solids
LA00000069014	POC	LA-MIN02-V.001	LASB50095	3	NCR-LANL-0128-16, NCR-LANL-0486-17	D001, POC Combustible	LA-RTR2-14-0027	Plastic bag, homogeneous solids
LA00000069083	55 gal	LA-MIN02-V.001	LASB50098	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0007	Scrap lead, plastic bags, 90 mil liner lid, homogeneous solids
LA00000069060	55 gal	LA-MIN02-V.001	LASB50100	3	NCR-LANL-0128-16	D001	LA-RTR2-13-0138	Scrap metal, liner lid, plastic bags, homogeneous solids
LA00000069080	55 gal	LA-MIN02-V.001	LASB50100	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0002	Scrap metal, scrap lead, plastic liner lid, plastic bag, homogeneous solids
LA00000069413	55 gal	LA-MIN02-V.001	LASB50100	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0027	Scrap lead, plastic bag, homogeneous solids
LA00000068679	55 gal	LA-MIN02-V.001	LASB50102	3	NCR-LANL-0128-16	D001	LA-RTR2-13-0133	Scrap lead, plastic bags, plastic lid, homogeneous solids
LA00000069180	55 gal	LA-MIN02-V.001	LASB50102	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0005	Scrap lead, plastic bags, homogeneous solids
LA00000068313	55 gal	LA-MIN02-V.001	LASB50103	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0007	Scrap lead, plastic bag, homogeneous solids
LA00000069041	55 gal	LA-MIN02-V.001	LASB50104	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0001	Scrap lead, homogeneous solids
LA00000069226	55 gal	LA-MIN02-V.001	LASB50104	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0010	Scrap metal, scrap lead, tape rolls, plastic bags, liner lid, homogeneous solids
LA00000069192	POC	LA-MIN02-V.001	LASB50105	3	NCR-LANL-0128-16, NCR-LANL-0486-17	D001, POC Combustible	LA-RTR2-14-0008	Plastic bags, homogeneous solids

Container Number	Container Type	Waste Stream Profile	Overpack Number	Waste Type	NCR ID Number	NCR Condition	RTR BDR Number	Contents
LA00000069063	55 gal	LA-MIN02-V.001	LASB50107	3	NCR-LANL-0128-16	D001	LA-RTR2-13-0138	Closure ring, plastic bags, liner lid, homogeneous solids
LA00000069189	POC	LA-MIN02-V.001	LASB50108	3	NCR-LANL-0128-16, NCR-LANL-0486-17	D001, POC Combustible	LA-RTR2-14-0010	Plastic bag, homogeneous solids
LA00000094211	POC	LA-CIN01.001	LASB50108	3	NCR-LANL-0128-16, NCR-LANL-0486-17	D001, POC Combustible	LA-RTR2-13-0103	Homogeneous solids
LA00000068396*	POC	LA-MHD01.001	LASB50109	2	NCR-LANL-0128-16, NCR-LANL-0486-17	D001, POC Combustible	LA-RTR2-13-0135	Scrap metal, tape roll, plastic bags
LA00000093031*	55 gal	LA-MHD01.001	LASB50320	2	NCR-LANL-0128-16	D001	LA-RTR2-13-0084	Open 5 gal metal bucket, open 20 gal drum, metal lids, hand tools, scrap metal, metal cans with material, metal can, drum lid, scrap lead, glass container, broken glass, plastic bags, homogeneous solids
LA00000069565	55 gal	LA-MIN02-V.001	LASB50414	3	NCR-LANL-0128-16	D001	LA-HERTR-14- 0043	Scrap lead, plastic bags, liner lid, homogeneous solids
LA00000069285	55 gal	LA-MIN02-V.001	LASB50416	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0014	Scrap lead, leather gloves, plastic bags, homogeneous solids
LA00000069279	55 gal	LA-MIN02-V.001	LASB50421	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0014	Scrap lead, plastic bags, homogeneous solids
LA00000069428	55 gal	LA-MIN02-V.001	LASB50421	3	NCR-LANL-0128-16	D001	LA-HERTR-14- 0030, LA-HERTR-14- 0030QTR	Tape rolls, plastic bags, 90 mil liner lid, homogeneous solids
LAS855638*	55 gal	LA-CIN01.001	LASB50423	2	NCR-LANL-0128-16	D001, D002	LA-HERTR-12- 0084	Metal cans with material, plastic bags, plastic tubing, homogeneous solids
LA00000069094	55 gal	LA-MIN02-V.001	LASB50424	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0007	Plastic bags, 90 mil liner lid, homogeneous solids

Container Number	Container Type	Waste Stream Profile	Overpack Number	Waste Type	NCR ID Number	NCR Condition	RTR BDR Number	Contents
LA00000069555	55 gal	LA-MIN02-V.001	LASB50424	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0037	Hardware, scrap lead, leather gloves, homogeneous solids
LA00000069099	55 gal	LA-MIN02-V.001	LASB50432	3	NCR-LANL-0128-16	D001	LA-RTR2-14-0007	Plastic bag, homogeneous solids